# A SEGMENTED COMPOSITION AND A METHOD AND A SYSTEM FOR MAKING SAME

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to compositions of the core-sheath type. More particularly, the present invention relates to cosmetic compositions having two or more components that are segmented therein. In addition, the present invention relates to the method of and apparatus for making such compositions.

### 2. Description of the Prior Art

Many consumers favor wax-free cosmetics. Wax-free cosmetics do not have a waxy feel or create a wax-like build-up. An example of a substantially wax-free cosmetic composition is provided in U.S. Patent No. 5,882,662, issued on March 16, 1999 to Pahlck et al., titled Cosmetic Compositions Containing Smectite Gels. This patent provides for a cosmetic composition comprising a smectite clay and a lipophilic polar solvent, which gels without the addition of a polar activator and without high shear.

However, many wax-free cosmetics lack the advantages inherent to wax-based cosmetics, which are preferred by many other consumers. Namely, wax-based cosmetics have high shine, soft feel, and good spreadability. Conventional wax-based lipsticks are manufactured by adding fats, oils, pigments or lakes, and other non-aqueous ingredients to a natural or synthetic hard wax base that is melted to enable the ingredients to be thoroughly mixed. Then, the mixed ingredients are cast into a mold that, after cooling, provides a cosmetic product, such as a lipstick.

Consumers would favor a cosmetic composition that could be molded to contain both the wax-based benefits of high shine, soft feel, and good spreadability, and the non-wax based benefits of no waxy feel and no wax-like build-up. However, the formation of such a cosmetic composition is problematic.

U.S. Patent No. 4,291,018, which issued on September 22, 1981 to Oeda et al., provides a lipstick of the core-sheath type having a first composition of low-viscosity, oily ingredients and a second composition of viscous, oily ingredients. This patent also discloses that, if the difference in melt (i.e. liquefying) temperatures between the two compositions is greater

than 5°C, the desirable properties of each composition fails to be fully achieved.

Given the foregoing, a need exists for a segmented cosmetic composition that can combine the advantages and benefits of both wax-free and wax-based compositions. There is also a need for an efficient method of and apparatus for manufacturing such a cosmetic composition.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a composition that combines the advantages of both a wax-based component and a wax-free component.

It is another object of the present invention to provide a cosmetic composition that has at least two segments, each having either a wax-free component or a wax-based component.

It is still another object of the present invention to provide such a cosmetic composition that has at least two segments, one having a wax-free component and the other having a wax-based component.

It is yet another object of the present invention to provide such a composition in which the wax-free component is a smectite clay dispersion.

It is a further object of the present invention to provide a method and an apparatus that uses a thermal exchange between a hot liquid component and a cold liquid component to solidify the two components and form a segmented solid composition.

These and other objects of the present invention are achieved by a composition having at least two segments or components. The first component is preferably a cool, wax-free component. The second component is preferably a molten wax. One of the first or second components is adjacent to, partially surrounded by, or fully surrounded by the other component.

The present invention also includes a method of and an apparatus for forming such a segmented composition comprising a cool, liquefied or dispersed component that solidifies when heated in communication with a hot, liquefied or dispersed component that solidifies when cooled. The thermal exchange of heat from the hot liquid/dispersion component to the cold liquid/dispersion component and coolness of the cold liquid/dispersion component to the hot liquid/dispersion

component, accelerates the solidification of the hot component and the cold component, thereby more rapidly forming the segmented composition. In other words, the heat from the hot component solidifies the cold component while the coolness from the cold component solidifies the hot component. As used herein, the terms "solidify", "solidifies" and variations thereof mean that the composition and/or component of the composition are provided with structural integrity by transferring/forming from a liquid/dispersion state to a solid or semi-solid state, or swelling to form a lattice-type structure.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIGS. 1 to 3 are sectional views illustrating a known molding apparatus for molding a lipstick of the core-sheath type;

FIG. 4 is a cross-sectional view illustrating the construction of the lipstick of Fig.3;

FIG. 5 is a partial cutaway perspective view of the lipstick of Fig. 4;

FIGS. 6 and 7 are sectional views of a preferred injection molding apparatus for use with the present invention; and

FIG. 8 is a sectional view of an alternative preferred embodiment of a molding apparatus using a perforated hollow core insert.

**DETAILED DESCRIPTION OF THE INVENTION**

The present invention provides a composition having at least two components. The components are preferably a hot component and a cool or cold component. The hot and cold components may be of any suitable ingredient or material that solidifies and provides structural integrity after they cool and warm, respectively. More preferably, the hot component is wax-based, while the cool component is wax-free. Moreover, the present invention provides for a method of and apparatus for using the thermal exchange properties of the two components during processing to form a segmented product. Such segmented products include many types of anhydrous and/or water-based cosmetic compositions, such as, for example, core-sheath type, pan type and marbleized type lipsticks and/or pomades; lip glosses; eyeshadows; concealers; moisturizers; skin care products; deodorants; and foundations.

The hot component of the present invention has a melting point preferably greater than about 50°C (about 120°F), more preferably greater than about 60°C (about 140°F). The hot component may use many different natural or synthetic waxes to provide structure to the final solid composition. The hot component of the present invention preferably includes one or more hard waxes having $C_8$ to $C_{50}$ hydrocarbons. A hard wax is one having a needle penetration in the range from about 2 millimeters to about 8 millimeters based on ASTM-D-1321. Hard waxes that can be used in the present invention include: carnauba, ozokerite, candelilla, paraffin, ceresin, lanolin, beeswax, polyethylene, and microcrystalline wax. Other examples of ingredients that contribute to the hard wax structure include: waxy esters such as behenyl behenate or behenyl erucate, fatty alcohols such as cetyl alcohol, fatty acids such as stearic acid, and jojoba oil. The wax of the present invention is most preferably a mixture of linear polyethylene and ozokerite.

The hot component may also include one or more ingredients that are not sensitive to heat. Such heat insensitive ingredients include: antioxidants; emollients and skin conditioning agents, such as fatty esters (for example, myristyl

lactate, decyl oleate, and $C_{12}$ to $C_{15}$ alkyl benzoate), naturally derived oils (for example, avocado oil, chamomile oil, mink oil, squalane, and wheat germ glycerides), diisostearyl fumerate, lanolin, polytriglyceryl erucate/eleostearate, ginko biloba extract, zinc oxide, water, cholesterol, biotin, allantoin, milk protein, lauryl PCA, phospholipids, and mixtures thereof; silicones such as dimethicone and cyclomethicone; germicides; humectants such as glycerin; insect repellents; lipid materials; occlusives such as castor oil, canola oil, methicone including fatty dimethicone, petrolatum, polydecene, jojoba oil, jojoba wax, and jojoba butter; pigments; preservatives; emulsifiers; skin protectants; stabilizers; thickeners; UV-absorbers; and mixtures thereof.

The preferred emollients include avocado oil, diisostearyl fumerate, lanolin, myristyl lactate, polytriglyceryl erucate/eleostearate, and mixtures thereof.

The preferred preservatives or stabilizers include: BHT; BHA; 4-hydroxybenzoic acid, its esters and its derivatives, such as methyl 4 hydroxybenzoate (methyl paraben); benzophenones and its derivatives, such as 2,4-dihydroxybenzophenone; benxotriazole and its derivatives, such as 2-(2′-hydroxy-5′-

methylphenyl)-2H-benzotriazole; chlorphenesin; and disubstituted methane derivatives such as dianisoyl methane.

The preferred skin conditioners or conditioning agents include cholesterol, biotin, chamomile oil, ginko biloba extract, zinc oxide, allantoin, and mixtures thereof.

The cool or cold component of the present invention has a liquid dispersion point preferably less than about 15°C (about 60°F), more preferably less than about 13°C (about 55°F), and most preferably less than about 11°C (about 52°F). The cool component is preferably wax-free. When the cool component is wax-free, it preferably includes a smectite clay. More preferably, the smectite clay is a synthetic smectite clay powder. The preferred synthetic smectite clay powder is lithium/magnesium/sodium silicate.

An example of such a lithium/magnesium/sodium silicate smectite clay is Lucentite SAN, which is manufactured by Co-op Chemical Co., Ltd. and distributed in the U.S. by Kobo Products, Inc., South Plainfield, NJ. Lucentite SAN is a powder having about 60 percentage by weight (wt%) to about 70 wt% lithium/magnesium/sodium silicate with the general structure:

$$Na_{0-0.33}\ (Mg_{2.67}\ Li_{0.33})(Si_4O_4)(OH)_2$$

and about 30 wt% to about 40 wt% quaternium-18, which has the general structure:

$$R_2N(CH_3)_2$$

where R is $C_{16}$ to about $C_{18}$.

In the preferred embodiment of the present invention, the smectite clay powder is dissolved in a liquid, such as water, an organic solvent, or an oil, to form a dispersion. The chosen liquid depends on the type of smectite clay used.

The smectite clay powder is preferably dissolved in an organic solvent, which is preferably a polar lipophilic hydrocarbon-based solvent. Organic solvents useful as solvents in the present invention include: acetates, alcohols, aliphatic hydrocarbons, phenyl di- and tri-methicones, benzoate esters and other aromatic hydrocarbons, salicylate esters, alcohol lactates (such as $C_{12-15}$ alcohol lactate), ethers, formamides, halogenated hydrocarbons, ketones, methacrylates, phthalates, sulfoxides, and mixtures thereof. An example of a preferred benzoate ester

useful in the present invention is a $C_{12}$ to $C_{15}$ alcohols benzoate. Such a $C_{12}$ to $C_{15}$ alcohols benzoate is available as Finsolv TN, manufactured by Finetex, Inc., Elmwood Park, NJ, and disclosed in U.S. Patents Nos. 4,275,222; 4,278,655; 4,293,544; 4,322,545; and 4,323,694. U.S. Patent No. 5,882,662 to Pahlck et al., which is incorporated herein by reference, provides details on the gelling of smectite clays with a $C_{12}$ to $C_{15}$ alkyl benzoate.

An example of a preferred ether useful as an organic solvent in the present invention is perfluoropolymethylisopropyl ether. Such an ether is available as Fomblin HC/R, manufactured by Ausimont SPA and distributed in the U.S. by Brooks Distribution Division, Inc., South Plainfield, NJ.

In a preferred embodiment of the present invention, about 10 wt% to about 50 wt% of the smectite clay powder is mixed with about 50 wt% to about 90 wt% of the organic solvent. More preferably, about 15 wt% to about 20 wt% of the smectite clay powder is mixed with about 80 wt% to about 85 wt% of the organic solvent. In a most preferred embodiment, about 18 wt% of the smectite clay powder is mixed with about 82 wt% of the organic solvent.

Optionally, heat sensitive ingredients can be added to the cool, wax-free component. These ingredients include: alcohols, ascorbyl phosphoryl, cholesterol, bioflavonoids, botanicals, fragrances, vitamins including vitamins A, B1, B2, B12, C and D3, perfloro-compounds, permethyl-compounds, pheromones, collagens, preservatives, retinols (such as retinyl palmitate), silicones, volatile compounds, yeast, and any derivatives thereof and any mixtures thereof. These ingredients can be active when added in an amount effective for providing a benefit associated with the ingredient.

Preferred vitamins include beta-carotene, tocopherol, vitamins A, B1, B2, B12, C and D3, and mixtures thereof. In the case of heat sensitive active ingredients, they can be incorporated into a solid, segmented composition without thermally degrading the active. This is a significant advance with respect to such compositions.

A method of forming a segmented cosmetic composition in accordance with the most preferred embodiment of the present invention is as follows:

The hot component is prepared by melting, for example, a conventional wax base and optionally mixing the melted wax base

with one or more additional ingredients. Preferably, the hot component is maintained at about 70°C to about 90°C (about 160°F to about 195°F), more preferably at about 80°C to about 85°C (about 175°F to about 185°F), in liquefied form until it is added to a molding apparatus. The cold component of the present invention is created, for example, by dissolving the smectite clay powder in the organic solvent to form a dispersion. The smectite clay dispersion may be pumpable, injectable or pourable depending on the amount of smectite clay used and the temperature at which the smectite clay is processed. Since the smectite clay dispersion is liquid when cold and solidifies at room temperature or above, it is preferably chilled during formulation to maintain it in liquefied form. This may be achieved by cooling the whole dispersion or by cooling the solvent before the powder is added to form the dispersion. Preferably, the cold component is maintained at about -4°C to about 13°C (about 25°F to about 55°F), more preferably at about 0°C to about 5°C (about 32°F to about 40°F), until it is added to the molding apparatus. Optionally, the cold component can be mixed with one or more heat-sensitive ingredients. The difference in the temperature point at which the hot component and cold component become liquefied/dispersed is at least 10°C to about 85°C, preferably about 25°C to about 70°C, more

preferably about 30°C to about 50°C, and most preferably about 35°C to about 45°C.

The present method uses a molding apparatus divided into two or more segments by an insert or separator. For example, the mold may have a first segment that surrounds a second segment in a core-sheath relationship. Alternatively, the first segment may be adjacent to, or only partially surrounding, the second segment.

In one embodiment of the method of the present invention, as illustrated in Figs. 1 to 5, a known mold comprises a lower part 1 having a cavity 4 for molding the body of a lipstick, and an upper part 2 for introducing the compositions thereto. As shown in Fig. 1, a rod 3 is inserted into the cavity 4 to form a core. The molten wax-based component 5 is then poured into the cavity 4 and allowed to partially "set-up". As is known by those skilled in the art, the term "set-up" means that the composition begins to solidify as its temperature approaches room temperature. Thereafter, the rod 3 is removed. Consequently, a core cavity 6 is molded as illustrated in Fig. 2. The cold, wax-free component 7, as shown in Fig. 3, is then poured unto the core cavity 6. The molten wax-based component 5 is juxtaposed to the cold, wax-free component 7. Heat from the

molten, wax-based component 5 and coolness from the cold, wax-free component 7 are conducted/exchanged, which simultaneously causes the wax-based component 5 to cool and the wax-free component 7 to warm. Upon cooling to approximately room temperature, the molten wax-based component 5 completely sets-up and solidifies. Similarly, upon warming to approximately room temperature, the cold wax-free component 7 swells and binds against the wax sheath and solidifies. The solidification forms a segmented lipstick product having a wax-based component 5 as the outer sheath and a wax-free component 7 as the core, as shown in Figs. 4 and 5. Alternatively, the cold, wax-free component 7 can form the outer sheath and the hot, wax-based component 5 can form the core.

The thermal exchange or exchange system of the present invention rapidly accelerates the manufacture of a segmented composition and obviates the need for other equipment, such as a chill table, typically used with hot melt products. Cosmetic products of the core-sheath type having a variety of shapes can be produced by changing the cross-sectional shapes of the cavity 4 and the rod 3 in the above-described mold. The cross-sectional shapes of the core and the sheath may be, for example, circular, elliptic, oval, triangular, square, rectangular, pentagonal, hexagonal, rhombic, or any intricate shape as a

result of the flowable properties of the components. However, a substantially concentric construction is preferred because of the ease of formation.

The foregoing method could be varied to form other types of cosmetic products. For example, both the hot, wax-based component and the cold, wax-free component could be simultaneously poured into the mold cavity (without the use of any rod or separator). The heat conducted from the hot or molten component to the cold component, and vice versa, would simultaneously set up the cold, component and the molten component. The hot, wax-based component and cool, wax-free component could then be blended shortly before the components are fully set, thereby creating a marbleized product.

In an alternative embodiment of the present invention, the segmented composition can be made by an injection molding apparatus shown in Figs. 6 and 7. In one form of the injection molding apparatus, a hollow injector 8 having a dispensing nozzle 9 is inserted into cavity 4 of mold 1. The molten component 5 is poured by any conventional means, such as by a human's hand, a container, a manual device or an automatic device, into cavity 4 and allowed to partially set-up as a sheath about injector 8. Injector 8 is then withdrawn by any

conventional means, such as, a human's hand, a manual device, and an automatic device, from cavity 4. As shown in Fig. 7, as injector 8 is withdrawn, the cold component 7 is dispensed though hollow injector 8 and discharged through dispensing nozzle 9 into a core cavity formed by the volume of injector 8. Once the injector 8 is fully withdrawn, the cold component fully fills the core cavity, as depicted in Fig. 3. The thermal exchange of the present invention rapidly accelerates the formation of a segmented composition, as described herein.

In a second form of the injection molding apparatus, the injector 8 is withdrawn from cavity 4 immediately after the molten component 5 is poured therein, without any set-up time. As injector 8 is withdrawn, the cold component 7 is discharged to fill the volume occupied by injector 8 to maximize the amount of heat available for exchange to the cold component and the amount of coolness available for exchange to the molten component, thereby providing even greater acceleration of the solidification of the segmented compositions. The second form of the injection molding apparatus works best when the two components are of sufficiently different densities and/or specific gravities to allow one component to remain as a centrally located core and not become substantially miscible with the other outer sheath component. The injection molding

apparatus can also be used to back-fill or top-fill pan-type or jar-type structures.

In another embodiment of the apparatus and system of the present invention, a non-removed, or permanent, hollow insert made of the core component material can be used to integrally form the core of the segmented composition. Alternatively, the hollow insert can be made of the sheath material and used to integrally form the sheath of the segmented composition. For example, if it was decided to make the sheath from the hot component material (that solidifies as it cools), and the core from the cold component material (that solidifies as it warms), the rod 3 of Fig. 1 can be replaced with a hollow insert made of the cold component material, which maintains its solid form when warmed. The molten sheath component material is then poured into cavity 4. Since the sheath component material is hot, it will have no adverse effect on the hollow insert, which is relatively thin but has sufficient structural integrity to support the forces of the hot sheath component material acting on its outer periphery. Into the hollow insert is then poured the cold core component material. As the cold core component is made of the same material as the hollow insert, the coolness of the cold core component material can immediately begin to liquefy/disperse the hollow insert on its inner periphery.

However, the simultaneous effect of the heat from the molten sheath component material will maximize the thermal exchange between the two components resulting in an immediate set-up of the components at their interface and a rapid acceleration of the solidification of the entire segmented composition.

In another aspect of this embodiment, the non-removed hollow core insert described above can be made of a core or sheath component material that remains in its solidified state even upon re-exposure to heat or cold, as the case may be. For example, the solid hollow insert can be made of a cold, liquid dispersion that solidifies upon exposure to warmth, but does not re-liquefy/disperse upon re-exposure to cold. In this embodiment, the non-reversible insert can be perforated, as shown in Fig. 8. By making the hollow insert 10 perforated, the heat from the hot sheath component material can more quickly pass to the cold core component material, and vice-versa, and rapidly accelerate the solidification of the segmented composition, while remaining an integral part of the core component. It is to be understood that the above-described non-removed, solid hollow insert may be made of any dissolvable or non-dissolvable material that will serve the same temporary membrane-type function, provided the material will be compatible with the intended use of the final product. In a further aspect

of this embodiment, a dissolvable membrane may be of a material that sublimates upon contact with the second component poured into the cavity.

It has been unexpectedly found that a segmented composition can be formed using the thermal exchange between a first component that is a liquid when heated and solidifies when cooled to room temperature or below and a second component that is a liquid when cold and solidifies when warmed to room temperature or above. The utilization of the thermal exchange between the two components is useful for the manufacture of numerous consumer products, such as core-sheath cosmetic products, especially lipsticks, set forth above.

Having thus described the present invention with particular reference to the preferred forms thereof, it will be obvious that various changes and modifications may be made without departing from the spirit and scope of the present invention as defined in the appended claims.